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EXAMINER

TRAN, THANH Y

ART UNIT PAPER NUMBER

2822

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/811,063

Applicant(s)

JOE A. HARRISON

Examiner

Thanh Y. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-30,35-37 and 39-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5,42 and 43 is/are allowed.
- 6) ☒ Claim(s) 6,8-30,35-37,39-41 and 44-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 6, 8-14, 25-30, 35-37 and 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. 6,276,943) in view of Tseng et al (U.S. 5,833,478).

As to claim 6, Boutros et al (U.S. 6,276,943) discloses in figures 1-5 a circuit board (3) comprising: circuitry (28); and a substrate (27) supporting the circuitry and having a contact edge to be inserted into a slot (14) of a slot connector housing assembly (1), the substrate (27) having an edge profile (32) engaged by the connector housing assembly (1) inside the slot (see element 14) in response to the substrate (27) being inserted into the slot (see element 14) to resist removal of the circuit board (3) from the slot connector housing assembly (1) (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

Boutros et al does not disclose a slot connector housing assembly mounted on a motherboard of a computer system. Tseng et al (U.S. 5,833,478) discloses in figures 1A-3A a circuit board wherein a slot connector housing assembly (1) is mounted on a motherboard (personal computer "PC" board 100) of a computer system. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus of Boutros by using the printed circuit board having a slot connector housing

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assembly which is mounted on a motherboard of a computer system as taught by Tseng et al.

One of ordinary skill in the art would have been obvious because mounting of the slot connector housing assembly on the motherboard would provide an interface between the inserted card/substrate ("SIMM") and the motherboard of the computer for use in communication system such as a personal computer ("PC") system (see col. 1, lines 15-40 in Tseng et al).

As to claims 8, 13, 26, 27, 29, 30 and 37, Boutros et al (U.S. 6,276,943) discloses in figures 1-5 a circuit board (3) and a corresponding method, wherein the slot connector housing assembly (1) comprises at least one of a spring (11) located entirely inside the slot and a plastic latch (see latch 16) internal to slot to engage the edge profile (32) (see col. 4, lines 25-33 and col. 5, line 56). It should be noted that: since the housing member/assembly 1 is made of plastic, the latch portion 18 is thus made of plastic.

As to claim 9, Boutros et al (U.S. 6,276,943) discloses in figures 1-5 a circuit board (3), wherein the profile comprises a notch (see the notch of circuit board as indicated at 32) formed in another edge of the substrate (27).

As to claim 10, figure 1 of Boutros et al shows that the another edge extends in an orthogonal direction to the edge inserted in the slot connector housing (1).

As to claim 11, Boutros et al (U.S. 6,276,943) discloses in figures 1-5 a circuit board (3) and a corresponding method comprising: supporting circuitry (28) on a substrate (27) to form a circuit board (3), the circuit board (3) having a contact edge comprising electrical contacts (29); and forming an edge profile (32) in the substrate (27) to engage a slot connector housing assembly (1) inside a slot (see element 14) of the slot connector housing assembly (1) in response to the substrate (27) being inserted into the slot (see element 14) to resist removal of the

circuit board (3) from the slot connector housing assembly (1), the slot (see element 14) adapted to receive the contact edge (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

Boutros et al does not disclose a slot connector housing assembly mounted on a motherboard of a computer system. Tseng et al (U.S. 5,833,478) discloses in figures 1A-3A a circuit board wherein a slot connector housing assembly (1) is mounted on a motherboard (personal computer "PC" board 100) of a computer system. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus of Boutros by using the printed circuit board having a slot connector housing assembly which is mounted on a motherboard of a computer system as taught by Tseng et al. One of ordinary skill in the art would have been obvious because mounting of the slot connector housing assembly on the motherboard would provide an interface between the inserted card/substrate ("SIMM") and the motherboard of the computer for use in communication system such as a personal computer ("PC") system (see col. 1, lines 15-40 in Tseng et al).

As to claim 12, and 36, Boutros et al discloses in figures 1-5 a circuit board (3) and a corresponding method, further comprising: engaging the profile (as indicated at 32) with a mechanism (comprising elements 2, 18) located inside the slot connector housing (1) (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

As to claim 14, figure 1 of Boutros et al further discloses the step of: forming electrical contacts (29) on a first edge of the substrate (27) to circuit board (3); and forming the profile (32) on a second edge of the substrate (27), the second edge extending in a direction substantially orthogonal to a direction along which the first edge extends.

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As to claims 25 and 28, Boutros et al discloses in figures 1-5 a slot connector and a corresponding method, comprising: a housing (1) including a slot (see element 14) to receive a circuit board (3); electrical contacts (11) to establish electrical communication with electrical contacts (29) of the circuit board (3); and a retention mechanism (18) to engage a profile (32) of the circuit board (3) to secure the circuit board (3) to the slot connector (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

Boutros et al does not disclose a slot connector housing assembly mounted on a motherboard of a computer system. Tseng et al (U.S. 5,833,478) discloses in figures 1A-3A a circuit board wherein a slot connector housing assembly (1) is mounted on a motherboard (personal computer "PC" board 100) of a computer system. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus of Boutros by using the printed circuit board having a slot connector housing assembly which is mounted on a motherboard of a computer system as taught by Tseng et al. One of ordinary skill in the art would have been obvious because mounting of the slot connector housing assembly on the motherboard would provide an interface between the inserted card/substrate ("SIMM") and the motherboard of the computer for use in communication system such as a personal computer ("PC") system (see col. 1, lines 15-40 in Tseng et al).

As to claim 35, Boutros et al discloses in figures 1-5 a circuit board (3) and a corresponding method comprising: supporting circuitry (28) on a substrate (27) to form a circuit board (3); forming an electrical contact edge on the substrate (27), the electrical contact edge to be inserted into a slot (see element 14) of a slot connector housing assembly (1); and forming an edge profile (32) in the substrate (27) to engage the slot connector housing assembly (1) inside a

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slot (see element 14) in response to the substrate (27) being inserted into the slot (see element 14) to resist removal of the circuit board (3) from the slot connector housing assembly (1), wherein the profile (as indicated at 32) comprises a notch formed in another edge of the substrate (27) (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

Boutros et al does not disclose a slot connector housing assembly mounted on a motherboard of a computer system. Tseng et al (U.S. 5,833,478) discloses in figures 1A-3A a circuit board wherein a slot connector housing assembly (1) is mounted on a motherboard (personal computer "PC" board 100) of a computer system. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus of Boutros by using the printed circuit board having a slot connector housing assembly which is mounted on a motherboard of a computer system as taught by Tseng et al. One of ordinary skill in the art would have been obvious because mounting of the slot connector housing assembly on the motherboard would provide an interface between the inserted card/substrate ("SIMM") and the motherboard of the computer for use in communication system such as a personal computer ("PC") system (see col. 1, lines 15-40 in Tseng et al).

As to claims 44, 45 and 48, Boutros et al discloses in figures 1-5 an apparatus, wherein the circuit board (3) is inserted in a first direction into the slot (see element 14) and the edge profile (32) engages the connector housing assembly (1) without substantial movement of the circuit board (3) in a second direction orthogonal to the first direction.

As to claims 46 and 47, Boutros et al discloses in figures 1-5 an apparatus, wherein the circuit board (3) is inserted in a first direction into the slot (see element 14) and the edge profile

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(32) engages the retention mechanism (18) without substantial movement of the circuit board in a second direction orthogonal to the first direction (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

3. Claims 15-16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. 6,276,943) in view of Pope et al (U.S. 6,135,781).

As to claims 15 and 18, Boutros et al discloses in figures 1-5 a connector comprising: a housing (1) including a slot (see element 14) to receive a circuit board (3); and electrical contacts (11) secured to the housing (1) to establish electrical communication with electrical contact pads (29) of the circuit board.

Boutros et al does not disclose the housing is formed from a material having a thermal conductivity of at least approximately 0.27 W/m-K so as to conduct heat away from circuitry of the circuit board. Pope et al teaches a housing (connector) comprising a material of Zenite (liquid crystal polymer) (see col. 57, lines 1-21) for conducting heat away from the circuit board. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the prior art of Boutros et al by using a material of Zenite (liquid crystal polymer) (which inherently has the same thermal conductivity and *approximately* 0.27 W/m-K as the liquid crystal polymer of the invention) for making the connector housing as taught by Pope et al. One of ordinary skill in the art would have been motivated because using a liquid crystal polymer having a low thermal conductivity of 0.27 W/m-K as Zenite would provide a good thermal conductor/conductance for conducting heat away from the inserted card (inserted circuit board) when it is inserted into the slot of the connector housing.

Furthermore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a liquid crystal polymer material having a thermal

conductivity of 0.27 W/m-K as Zenite for making the housing for providing a good thermal conductor, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

As to claims 16 and 19, Boutros et al does not teach the material comprises a liquid crystal polymer. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the connector of Boutros et al by using a liquid crystal polymer material for the housing for providing a low thermal conductance in order to protect the circuit board, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

4. Claims 17 and 20, are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. 6,276,943) in view of Pope et al (U.S. 6,135,781) as applied above in claims 15, 18, 21-23 and 39 and further in view of Volz et al. (U.S. 5,353,191).

As to claims 17 and 20, Boutros et al discloses a connector and a corresponding method in figures 1-5, comprising: a slot connector/housing (1) having a slot (see element 14) to receive a circuit board (3); and an edge of the slot connector (1) to mount to another circuit board. Boutros et al and Pope et al do not teach the housing (connector) and a corresponding method comprising forming fins in the housing to conduct heat away from the circuit board; and forming the fins out of a liquid crystal polymer. Volz et al teaches a housing (10, Fig. 1) comprising fins (20) to promote conduction of heat away from the circuit board (see col. 3, line 60 – col. 4, line 16); and forming the fins out of a liquid crystal polymer. Therefore, it would have been obvious

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to a person having ordinary skill in the art at the time the invention was made to modify the housing of Boutros et al and Pope et al by including fins as taught by Volz et al for the purpose of releasing heat from the circuit board.

5. Claims 21-24 and 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. 6,276,943) in view of Volz et al (U.S. 5,353,191)

As to claims 21, 22, 24 and 39-40, Boutros et al discloses a connector and a corresponding method in figures 1-5, comprising: a slot connector/housing (1) having a slot (see element 14) to receive a circuit board (3); and an edge of the slot connector (1) to mount to another circuit board. Boutros et al does not teach the housing (connector) and a corresponding method comprising forming fins in the housing to conduct heat away from the circuit board; and forming the fins out of a liquid crystal polymer. Volz et al teaches a housing (10, Fig. 1) comprising fins (20) to promote conduction of heat away from the circuit board (see col. 3, line 60 – col. 4, line 16); and forming the fins out of a liquid crystal polymer. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the housing of Boutros et al by including fins as taught by Volz et al for the purpose of releasing heat from the circuit board.

As to claim 23, Boutros et al, Pope et al, and Volz et al do not teach each of the clearances is in a range between approximately $\frac{1}{4}$ inches and approximately $\frac{3}{8}$ inches. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the circuit board of Boutros et al, Pope et al, and Volz et al by including each of the clearances is in a range between approximately $\frac{1}{4}$ inches and approximately $\frac{3}{8}$ inches. One of

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ordinary skill in the art would have been motivated because ¼ inches and 3/8 inches rule are standard sizes and would be provided to fit/mate with the sizes of connector and circuit board, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

As to claim 41, Boutros et al discloses in figures 1-5 an apparatus, further comprising a retention mechanism (18) located partially inside the housing (1) to engage the circuit board (3) to resist removal of the circuit board from a housing (1) (see Figs. 1-5, col. 4, line 24 - col. 6, line 7).

Response to Arguments

6. Applicant's arguments with respect to claims 6, 8-14, 25-30, 35-37 and 44-48 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argued that the combined teaching of references of Boutros and Pope is improper. Thus Examiner fails to show why one skilled in the art would have modified a modular plug Ethernet connector, that dissipates a relatively small amount of thermal energy, with a material for a housing that has a thermal conductivity of at least 0.27 W/m.K.

In response, The Examiner disagrees with Applicant's argument Boutros discloses all limitations as set forth in recited independent claims 15 and 18, except for the housing which is formed from a material having a thermal conductivity of at least approximately 0.27 W/m.K. However, Pope teaches in figure 1 a housing ("connector housing component" 16) could be formed from "Zenite" material (liquid crystal polymer) (see col. 57, lines 1-21). Since "Zenite" (liquid crystal polymer) material could be used for forming a housing ("connector housing

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component” 16) of Pope, it is considered that housing (“connector housing component” 16) of Pope formed from the same material as the housing material of the invention and thus it would provide the same thermal conductivity of at least *approximately* 0.27 W/m. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the connector housing of Boutros by using “Zenite” (liquid crystal polymer) material having a thermal conductivity of at least approximately 0.27 W/m.K as taught by Pope. One of ordinary skill in the art would have been motivated because using “Zenite” (liquid crystal polymer) material for the connector housing would provide a good thermal conductor (Applicant can see col. 3, lines 16-23 in the recited reference of Rossi (U.S. 2002/0046762), the Zenite/liquid crystal polymer material produced by DuPont would provide a good thermal conductor).

Furthermore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a liquid crystal polymer material having a thermal conductivity of 0.27 W/m-K as Zenite for making the housing for providing a good thermal conductor, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Applicant further argued that the Examiner fails to show where the prior art contains the alleged suggestion or motivation to modify Boutros’ modular housing to have fins to conduct heat away from the circuitry of a circuit board.

In Response, the Examiner disagrees with Applicant’s argument because Boutros discloses all limitations as set forth in recited independent claims 21 and 39, except for the slot connector comprising the fins to conductor heat away from the circuitry of the circuit board. However, Volz et al teaches in figure 1 a connector 10 comprising fins 20, since fins are made

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from the material which is thermally conductive (see the ABSTRACT in Volz et al), this fins 20 would conduct heat away from the circuitry of the circuit board. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus of Boutro by including thermal conductive fins as taught by Volz for the purpose of conducting heat away the circuitry of circuit board. The modified fins of Volz would be formed on the slot connector of Boutro for conducting heat away from the circuitry (28) of circuit board (3) when it is inserted into the slot of the connector (1) as shown in figure 1 of Boutro.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rossi (U.S. 2002/0046762) discloses thermoelectric generators.

Kobayashi et al (U.S. 6,413,109) discloses card edge connector having a ground contact.

Liu (U.S. 6,231,364) discloses memory module connector.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on M-F (9-6:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TYT


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